PROGRAM CODE

```c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

void display();

int atoi(const char *str) {
    int result = 0;
    int sign = 1;
    int i = 0;

    // Handle whitespaces
    while (str[i] == ' ' || str[i] == '\t' || str[i] == '\n')
        i++;

    // Handle sign
    if (str[i] == '-' || str[i] == '+') {
        sign = (str[i++] == '-') ? -1 : 1;
    }

    // Process digits
    while (str[i] >= '0' && str[i] <= '9') {
        result = result * 10 + (str[i] - '0');
        i++;
    }

    // Apply sign
    return sign * result;
}

// Convert an integer to a string
char* itoa(int num, char* str, int base) {
    int i = 0;
    int isNegative = 0;

    // Handle 0 explicitly, otherwise empty string is printed
    if (num == 0) {
        str[i++] = '0';
        str[i] = '\0';
        return str;
    }

    // Handle negative numbers for bases other than 10
    if (num < 0 && base != 10) {
        isNegative = 1;
        num = -num;
    }

    // Process individual digits
    while (num != 0) {
        int rem = num % base;
        str[i++] = (rem > 9) ? (rem - 10) + 'a' : rem + '0';
        num = num / base;
    }
```

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    // Append negative sign for base 10
    if (isNegative && base == 10)
        str[i++] = '-';

    str[i] = '\0';

    // Reverse the string
    int start = 0, end = i - 1;
    while (start < end) {
        char temp = str[start];
        str[start] = str[end];
        str[end] = temp;
        start++;
        end--;
    }

    return str;
}

int main()
{
    char a[10], ad[10], label[10], opcode[10], operand[10], symbol[10];
    int start, diff, i, address, add, len, actual_len, finaddr, prevaddr, j = 0;
    char mnemonic[15][15] = {"LDA", "STA", "LDCH", "STCH"};
    char code[15][15] = {"33", "44", "53", "57"};

    FILE *fp1, *fp2, *fp3, *fp4;
    fp1 = fopen("output.txt", "w");
    fp2 = fopen("symtab.txt", "r");
    fp3 = fopen("intermediate.txt", "r");
    fp4 = fopen("objcode.txt", "w");

    fscanf(fp3, "%s\t%s\t%s", label, opcode, operand);

    while (strcmp(opcode, "END") != 0)
    {
        prevaddr = address;
        fscanf(fp3, "%d%s%s%s", &address, label, opcode, operand);
    }
    finaddr = address;

    fclose(fp3);
    fp3 = fopen("intermediate.txt", "r");

    fscanf(fp3, "\t%s\t%s\t%s", label, opcode, operand);
    if (strcmp(opcode, "START") == 0)
    {
        fprintf(fp1, "\t%s\t%s\t%s\n", label, opcode, operand);
        fprintf(fp4, "H^%s^00%s^00%d\n", label, operand, finaddr);
        fscanf(fp3, "%d%s%s%s", &address, label, opcode, operand);
        start = address;
        diff = prevaddr - start;
        fprintf(fp4, "T^00%d^%d", address, diff);
    }
```

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```c
    while (strcmp(opcode, "END") != 0)
    {
      if (strcmp(opcode, "BYTE") == 0)
      {
        fprintf(fp1, "%d\t%s\t%s\t%s\t", address, label, opcode, operand);
        len = strlen(operand);
        actual_len = len - 3;
        fprintf(fp4, "^");
        for (i = 2; i < (actual_len + 2); i++)
        {
          itoa(operand[i], ad, 16);
          fprintf(fp1, "%s", ad);
          fprintf(fp4, "%s", ad);
        }
        fprintf(fp1, "\n");
      }
      else if (strcmp(opcode, "WORD") == 0)
      {
        len = strlen(operand);
        itoa(atoi(operand), a, 10);
        fprintf(fp1, "%d\t%s\t%s\t%s\t00000%s\n", address, label, opcode, operand, a);
        fprintf(fp4, "^00000%s", a);
      }
      else if ((strcmp(opcode, "RESB") == 0) || (strcmp(opcode, "RESW") == 0)) {
        fprintf(fp1, "%d\t%s\t%s\t%s\n", address, label, opcode, operand);
      }
      else
      {
        while (strcmp(opcode, mnemonic[j]) != 0)
          j++;
        if (strcmp(operand, "COPY") == 0)
          fprintf(fp1, "%d\t%s\t%s\t%s\t%s0000\n", address, label, opcode, operand, code[j]);
        else
        {
          rewind(fp2);
          fscanf(fp2, "%s%d", symbol, &add);
          while (strcmp(operand, symbol) != 0)
            fscanf(fp2, "%s%d", symbol, &add);
          fprintf(fp1, "%d\t%s\t%s\t%s\t%s%d\n", address, label, opcode, operand, code[j], add);
          fprintf(fp4, "^%s%d", code[j], add);
        }
      }

      fscanf(fp3, "%d%s%s%s", &address, label, opcode, operand);
    }

    fprintf(fp1, "%d\t%s\t%s\t%s\n", address, label, opcode, operand);
    fprintf(fp4, "\nE^00%d", start);

    fclose(fp4);
    fclose(fp3);
    fclose(fp2);
    fclose(fp1);
```

```c
    display();

    return 0;
}

void display() {
    char ch;
    FILE *fp1, *fp2, *fp3, *fp4;

    printf("\nIntermediate file is converted into object code");

    printf("\n\nThe contents of Intermediate file:\n\n");
    fp3 = fopen("intermediate.txt", "r");
    ch = fgetc(fp3);
    while (ch != EOF)
    {
        printf("%c", ch);
        ch = fgetc(fp3);
    }
    fclose(fp3);

    printf("\n\nThe contents of Symbol Table :\n\n");
    fp2 = fopen("symtab.txt", "r");
    ch = fgetc(fp2);
    while (ch != EOF)
    {
        printf("%c", ch);
        ch = fgetc(fp2);
    }
    fclose(fp2);

    printf("\n\nThe contents of Output file :\n\n");
    fp1 = fopen("output.txt", "r");
    ch = fgetc(fp1);
    while (ch != EOF)
    {
        printf("%c", ch);
        ch = fgetc(fp1);
    }
    fclose(fp1);

    printf("\n\nThe contents of Object code file :\n\n");
    fp4 = fopen("objcode.txt", "r");
    ch = fgetc(fp4);
    while (ch != EOF)
    {
        printf("%c", ch);
        ch = fgetc(fp4);
    }
    fclose(fp4);
        printf("\n");
}
```

OUTPUT

```
gopikrishna_52@GOPIKRISHNA:~/Desktop$ gcc pass2.c
gopikrishna_52@GOPIKRISHNA:~/Desktop$ ./a.out

Intermediate file is converted into object code

The contents of Intermediate file:

        LnS     START   2000
2000    **      LDA     FIVE
2003    **      STA     ALPHA
2006    **      LDCH    CHARZ
2009    **      STCH    C1
2012    ALPHA   RESW    2
2018    FIVE    WORD    5
2021    CHARZ   BYTE    C'Z'
2022    C1      RESB    1
2023    **      END     **


The contents of Symbol Table :

ALPHA   2012
FIVE    2018
CHARZ   2021
C1      2022


The contents of Output file :

        LnS     START   2000
2000    **      LDA     FIVE    332018
2003    **      STA     ALPHA   442012
2006    **      LDCH    CHARZ   532021
2009    **      STCH    C1      572022
2012    ALPHA   RESW    2
2018    FIVE    WORD    5       000005
2021    CHARZ   BYTE    C'Z'    5a
2022    C1      RESB    1
2023    **      END     **


The contents of Object code file :

H^LnS^002000^002023
T^002000^22^332018^442012^532021^572022^000005^5a
E^002000
gopikrishna_52@GOPIKRISHNA:~/Desktop$ ▯
```